



**Northgate Mall Case Study:
An Evaluation of Natural Drainage for
Parking Lot Development**
January 31, 2005

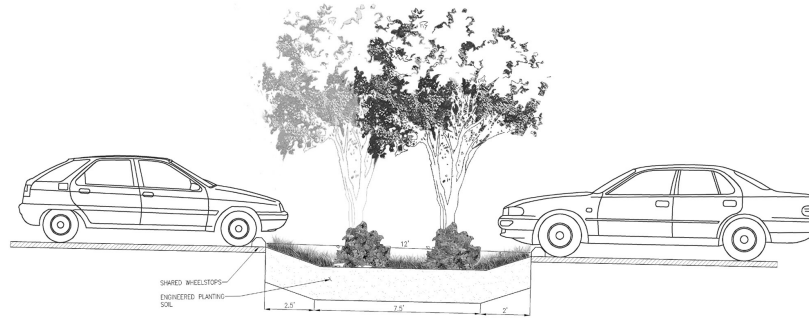
Background:

The City's Northgate Framework Resolution states that Seattle Public Utilities (SPU) will identify "natural drainage strategies that can be incorporated into development projects." The Northgate Mall redevelopment offered a valuable case study to evaluate a natural drainage approach due to the size of redevelopment, its highly visible location in Thornton Creek watershed, and the opportunity to establish a model for using natural systems in parking lots. In addition, the Northgate Mall (between Simon and the City) states that "Simon will consider incorporating natural drainage techniques into its approach to required landscaping and stormwater management".

Natural Drainage Feasibility Study

The purpose of the feasibility study was to determine whether a natural drainage system (NDS) approach would be feasible, cost-effective, and meet water quality code requirements. The SPU team in collaboration with Simon's design team (KPFF, Atelier, and Callison Architects) developed three natural drainage alternatives, and estimated construction and life cycle maintenance costs for each. These NDS approaches feature different combinations of swales, unit pavers and porous asphalt designed to generate additional drainage and water quality benefits relative to the standard regulatory approach.

All three NDS options rely on a "telescoping" swale that is integrated into every other parking aisle to collect, filter, infiltrate and convey runoff from the adjacent parking area. The "telescoping" swale was designed specifically to respond to Simon's objectives to retain the maximum number of surface parking spaces and minimize the number of compact spaces. The swale begins with a narrow four-foot width adjacent to the larger parking spaces closest to the storefronts and widens to a 12-foot dimension adjacent to the compact spaces located furthest from the storefront. The compact spaces provide eight feet in the length of the swale.



Summary of Options

Option	Features
1	Standard regulatory approach - Central water quality vault
2	- "telescoped" swales throughout main parking lot - unit pavers along "Retail Drive," perimeter stalls - porous asphalt in lower-use Southwest lot
3	- "telescoped" swales throughout main parking lot - unit pavers along "Retail Drive," perimeter stalls - replace porous asphalt in SW lot with additional "telescoped" swales;
4	- "telescoped" swales throughout main parking lot - replace unit pavers with catch basin water quality filters along perimeter of lot - replace porous asphalt in SW lot with additional "telescoped" swales;

Economic Analysis

	Design			Drainage Benefit			Cost (in millions)
	Swales	Pavers	Asphalt	Water Quality	Demo	Infiltration	Construction
Option 1							\$6.2
Option 2	√	√	√	√√√	√√√	√√√	\$6.4
Option 3	√	√		√√	√√	√√	\$6.1
Option 4	√			√	√	√	\$5.7

* Construction cost estimate includes total parking lot redevelopment.

Additional Benefits

- Reduced impervious surface
- Increased landscaping every other parking aisle
- Enhanced traffic calming and pedestrian way-finding

Summary

The SPU staff team determined that a natural drainage approach is not only feasible in parking lot redevelopment, but can provide additional drainage and aesthetic benefits not realized by a traditional code compliance approach. In addition, the team determined that

if a project has water quality requirements, a natural drainage approach can be about 12% less expensive. The team concluded that swales are generally less cost per acre than porous pavement. The use of porous pavement reduces total impervious surface on the site and, in the case of unit pavers, can offer other benefits such as improved aesthetics, pedestrian way-finding, and traffic calming.